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So many requests are received from abroad for parts of the *Agricultural Journal* which were never published that the following list of all issues available is given for reference. Attention is directed especially to Volume 7 which had only one part :—

Vol.		Vol.	
1.	3 numbers, 1928.		(None of No. 2).
2.	4 " 1929.	10.	4 " 1939
4.	4 " 1931.		(None of No. 4).
5.	2 " 1932.	12.	4 " 1941
6.	2 " 1933.		(None of Nos. 1 and 2).
7.	1 number, 1934.	13.	4 numbers, 1942.
8.	4 numbers, 1935-37	14.	4 " 1943.
	(None of Nos. 2 and 4).	15.	4 " 1944.
9.	4 numbers, 1938	16.	4 " 1945.

ISSUES OF THE AGRICULTURAL CIRCULAR.

NUMBERS and year of issue of the *Agricultural Circular*:—

Vol. 1, 1920, 12 numbers.	Vol. 4, 1923, 1 number.
" 2, 1921, 5 "	" 5, 1924-5, 2 numbers.
" 3, 1922, 4 "	

As number 4 of Vol. 3 was printed as "Volume 4" and number 1 of Vol. 4 as "Volume 5" it would appear from an inspection of a complete set that Volume 4 comprised only a number 4 and that there were two issues of Volume 5, No. 1.

ANNUAL BULLETINS.

THE Annual Bulletin of Divisional Reports ran from 1931 to 1938 and was then discontinued.

OLD ISSUES OF AGRICULTURAL BULLETINS.

FREE copies of the following Bulletins are available to Colonial Departments of Agriculture, research institutes and bona fide planters, etc.:—

- No. 1. Sisal Hemp in Fiji, 1911.
3. Rhinoceros Beetle in Samoa, 1912.
4. The Banana in Fiji, 1912.
5. Scale Insect on Bananas, 1913.
6. Lemon Grass, 1913.
7. A Mission to Java for a Coleopterous Pest of Bananas, 1914.
8. Coconut Experiments, 1915.
9. Soils of Fiji—I., 1916.
11. Alluvial Soils of Fiji, 1919.
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13. Sea Island Cotton, 1920.
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17. Early Nutfall in Coconuts, 1930.
18. Control of Coconut Spike Moth, 1935.
19. Fruit Fly Investigations, 1936.
21. Biological Control of the Rhinoceros Beetle, 1941. Price 1s.
22. An Introduction to the Mosquitoes of Fiji, 1943.
- Fijian Plant Names, 1942. Price 3s. 6d., 4s. and 6s.

Applications should be made to the Librarian, Department of Agriculture, Suva, Fiji.

—EDITOR.

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AGRICULTURAL JOURNAL

ISSUED BY THE

DEPARTMENT OF AGRICULTURE, FIJI.

VOL. 17.]

JUNE, 1946.

[No. 2

EDITORIAL. WORLD FOOD CRISIS.

At no time in the history of civilization has man been faced with a problem of food shortage of the magnitude that exists to-day. From time to time crop failures have occurred in many quarters of the earth but in general, famines have been localised and succour from more favoured areas has been rapid and complete.

To-day the population of the whole of Europe and of large areas of Asia are faced with unprecedented food shortages at a time when under-nutrition during the war period has seriously affected health and lowered resistance to disease; indeed, it is certain that unless rapid and effective assistance is forthcoming millions of people face death by starvation, and the health of millions of children, who may escape death from starvation, will be permanently impaired.

The areas involved in this World Food Crisis are so extensive that it is impossible for any one nation or small group of nations to cope with the situation. A world organization is the only hope and to-day the Food Organization of the United Nations has called upon all favoured nations to extend to the utmost their production of meat, butter, cheese, cereals, vegetable fats, sugar and other carbohydrates and protein foods.

The causes for this world calamity have their roots in the War: thousands of acres of the most fertile lands of Europe and Asia have been directly involved in the struggle and have remained unplanted; thousands of acres of permanent crops have been destroyed and livestock have been driven from their pastures and consumed by enemy occupation forces. Many square miles of country which once carried agricultural crops and livestock have been rendered unproductive through lack of artificial fertilizers; and agricultural equipment is not in sufficient supply to meet the urgent need of accelerated production. Enemy occupation forces have plundered or destroyed stores of grain and animal foodstuffs and to add to the chaos, transport systems, roads, railways and water-ways have been almost completely disrupted.

The burden of restoring the food situation rests almost entirely with the United States of America, the British Commonwealth of Nations and the South American Republics. The agriculture of the United States and the Commonwealth has had to contend with many difficulties occasioned by the direct demands of war and although a war economy is rapidly merging into a peace economy the production of tractors and other farm implements is still insufficient to meet the demand. Lack of fertilizers during the war years is now having its effect and the grazing areas of New Zealand and Australia, which are dependent for their productive capacity on top-dressing with phosphate fertilizers, are now showing signs of deterioration.

The Right Honourable the Secretary of State for the Colonies has made an urgent appeal to all Colonial peoples to make a maximum effort during the next few months to increase the production of vital export crops and,

as far as it is possible, to establish local self-sufficiency in food. It is our bounden duty therefore, to consider ways and means of answering this appeal in a manner which will do credit to the Colony.

Directly, we can assist by pushing up the production of sugar and copra to the maximum possible. The sugar industry is recovering from its set backs and all possible is being done to reach the goal of full output. The copra industry has still a long way to go to reach the peak of 33,000 tons. In 1945 the production reached 23,000 tons and in 1946 a preliminary estimate of 25,000 tons may be exceeded. If we could reach our maximum output we would be producing an additional 6,000 tons of oil and approximately 4,000 tons of coconut meal. This means, with the present fat ration of 6 oz. per head weekly in Great Britain, we could give 42,000,000 people a weekly ration of margarine and moreover, provide 320,000 cows with concentrates for a similar period. This would be no mean achievement and one that I commend to the serious attention of all who are concerned with the coconut industry.

Indirectly, we can assist in avoiding waste, in stepping up food production and finally by supplying, as far as our own requirements allow, animal feeding stuffs to the Dominion of New Zealand where the pastures are being forced to the limit in the production of meat and butter for Britain.

Our own farming problems are not light and, in general, the farmers of Fiji are to be congratulated for the manner in which the food problem during the war years was met and solved. The excessive pressure on the dairy and food lands during the war has left its effect in lowered production and marked improvement will not be possible until fertilizers, agricultural equipment and labour are again available in adequate supply.

One bright feature of local agriculture is the marked improvement in rice production. The present harvest is the largest in the history of the Colony and although returns are not yet complete it is probable that self-sufficiency in this important food crop has been reached. This is a notable achievement and will have the effect of freeing Australian rice for more urgent needs.

During the War years the cover of the *Journal* bore the slogan "GROW MORE FOOD." A new war is with us, a war to combat famine and that slogan holds with even greater force to-day. The farmers and planters of Fiji have a duty and a responsibility greater than ever before: they must grow more and more food and cut more and more copra.

—W.J.B.

IRRIGATION.

by

C. R. VASEY and S. BHARAT.

THERE is an interesting example at Votualalai in the Province of Nadroga and Navosa of a natural watercourse being used for rice irrigation by Indian peasant farmers.

This scheme was started by one Govind Yankaiya who came to Fiji as an indentured labourer in 1911. He had seen and grown rice under irrigation in South India, where the water is supplied by Government in irrigation ditches. On the completion of his term of indenture he became a cane grower for twenty years, during which time he was on the look out for suitable land to grow rice under irrigation. While growing cane he attempted several small schemes, using small creeks for his water supply.

In 1938 he obtained a lease of 76 acres of native land at Votualalai and commenced his irrigation scheme which has developed on a fairly large scale—at least for Fiji. The land was covered in Koster's Curse and guava which took him three years to clear. During the time of clearing he managed to plant up small areas of rice.

With the land cleared he commenced to lay out his irrigation scheme. Using what implements he had to hand and without instruments he graded and levelled the land and constructed his channels. He erected a small dam to divert water from a creek back in the hills and by following the contour of the hill he eventually brought it a distance of about 20 chains to the boundary, crossing a deep drain by means of a hollow log.

As the irrigable area grew, Govind Yankaiya saw that he could not manage the whole of the area himself so he sub-leased portion of it to four other Indians. With the success of Govind Yankaiya before them they followed his example and continued the development of irrigation.

Some fifty odd acres of the area is now under irrigation. The balance is planted with rice, or used for grazing the stock of the rice growers.

The water is carried in a head channel and is diverted into subsidiary channels which carry it to the more distant parts of the fields; small banks have been thrown up to give control of the water when it is on the field. When rainfall is insufficient for the needs of the crop, additional water is supplied by irrigation.

A number of different varieties of rice have been grown, but latterly the farmers have favoured New Guinea as they feel that this variety grows better under irrigation than do the others. In good seasons Govind Yankaiya maintains that he has had crops yielding 30 bags of padi to the acre, while in an average season he obtains 20-25 bags of padi to the acre.

The weed, muraina grass (*Ischaemum-rugosum*) has become more and more of a problem. Last year for the first time, on the advice of the Agricultural Assistant, Sigatoka, rice was planted out of season. Transplanting took place in July and August and harvesting in December, thus the rice grew and matured before the muraina came up. The settlers plan to carry out this arrangement again this year, as they consider they obtain better crops without the worry of weeding out muraina grass.

Travellers passing down Queen's Road have possibly seen this area of rice, which is about half a mile on the Suva side of Votualalai village, some 17½ miles before Sigatoka.

Up at Tavuto, Nadroga, another small area of rice is under irrigation. Here Ram Charan is using water from a creek and bringing it about three chains to his 15-acre rice field. This scheme has been in operation for about five or six years.

At Nadi, Raghu Nath of Nadele has taken advantage of a nearby creek in this locality for irrigation. The water has been used during the dry season on a three and a half acre field for vegetable growing. The scheme commenced in 1944 when there was a strong demand by the Military for vegetable supplies.

AGRICULTURAL NOTES.

THE weather has been seasonal, with floods on the Wainibuka River, where some damage has been caused to banana and food crop plantings. On the whole, the weather was favourable to all growing crops.

CROPS.

Bananas.—Replanting of plantations on the Wainibuka River has proceeded rapidly after the severe flooding experienced on the river in March last. Replanting of other areas is proceeding slowly. The care of plantations in general leaves much to be desired as is evidenced by the quality of fruit submitted for export to New Zealand.

Growers are reminded that failure to improve the quality and pack of their fruit cannot but have a depressing effect on markets. Unless a determined effort is now made by growers to replant and maintain their plantations in good order so that first class fruit only is produced, the industry as a whole may be reduced to uneconomic proportions. With the possibility of shipments to Canada in the near future, first class bunches will be required.

Citrus.—The citrus crop was fair. Owing to lack of shipping facilities a small quantity only was exported to New Zealand. Several consignments of excellent grape fruit were forwarded to New Zealand.

Dalo.—This and other native roots have been plentiful owing to a diminished demand from the Military units.

Maize.—Supplies have been about average for the season with prices ranging from 17/- to 30/- per bag in Suva, of not less than 200 lbs.

Peanuts.—This season's crop has been up to average, yields of $\frac{1}{2}$ ton per acre being recorded. Some 1,342 bags have been exported to New Zealand where demand was brisk at favourable prices.

Potatoes.—Some thirty tons of seed potatoes are expected to arrive in the Colony, most of which will be held for planting in the Sigatoka Valley. With favourable weather this should prove a useful addition to local food supplies.

Rice.—Reports indicated that this crop has made very satisfactory growth and that although a slightly smaller area to that of last year has been planted yields are expected to more than make good the short planting.

"Rice Yellows" was not much in evidence, in most areas where it normally appeared timely rains prevented its spread.

After the floods of late March outbreaks of army and cut worm attacks were experienced on young rice; prompt attention was called to methods of control and in no case was serious damage recorded.

Government price control is still in operation and will remain until further notice, with prices for padi as follows: Viti Levu, £12 10s. per ton naked, £13 10s. per ton bagged; Vanua Levu, £12 per ton naked, £13 per ton bagged; in all cases at nearest port, mill or road point.

Sugar Cane.—It is gratifying to note that the area planted to sugar cane is now approaching the total originally under that crop before the troubles of 1943. Next year should see production back to normal.

Pastures.—The wet weather combined with lack of weeding due to labour shortage resulted in poorer pastures and poorer returns to the dairy farmer. It is noted however that labour conditions are improving and efforts to secure control of noxious weeds in certain areas are now being made.

WEED CONTROL.

In July, 1945, the Department of Agriculture initiated steps to secure some measure of weed control in the two main dairy farming areas of the Colony. The two weeds to which attention was particularly directed were the Hibiscus Burr (*Urena lobata*) and prickly Solanum (*Solanum torvum*), both serious weeds of the pastures and roadsides in these two localities. Most of the farmers responded to the call to cut down these and others weeds at flowering and before seeding time, usually June/July and good work was done. It is worth while reminding farmers of the old adage "one year's seeding, seven years weeding," and attention to the truth of this old saying would ensure a quicker control of noxious weeds everywhere. Farmers of these two areas in particular and those in other areas where weeds occur are again expected to tackle this problem this year, as enthusiastically as they did last year, with, it is hoped even better results.

EXTENSION SERVICES.

The field staff gave considerable time, thought, and advice to the public and the Education Department, on problems of land use which were submitted to them. The following investigations were carried out and reported upon :—

- (a) Inspection of the Tailevu North coastal area from Lodoni to Silana to select a site for the Provincial School Eastern.
- (b) Re-inspection of the suggested site for the Queen Victoria School.
- (c) Selection of a school site for the Indian community of Dawasamu Valley.
- (d) Inspection of the old Queen Victoria School site to report on the possibility of the area supporting sufficient livestock as well as furnishing sufficient food crops for the use of students at the proposed Teachers' Training Institute.
- (e) Layout and beautification of the grounds of the Tamavua Tuberculosis Hospital near Suva.
- (f) Advice on land use at the hill station of Nadarivatu and the provision of a suitable plan for the layout of fields.

Soil Conservation.—The value of terracing as a means of soil conservation was demonstrated at the Dobuilevu Demonstration Farm, Ra, during the flooding of this station earlier in the year. The terraces then formed held during the flooding and on the waters receding a valuable deposit of silt was left on each terrace, and no scouring occurred.

Pen Manure.—The manufacture of pen manure was successfully carried out at the Central Agricultural Station, Naduruloulou; stock being housed overnight and the bedding and manure thereby collected was saved and applied to vegetable gardens with satisfactory results.

Wild Pig Menace.—As an instance of what community effort will do to reduce the incidence of certain pests of crops, the Indian settlers of the Vunikavikaloa settlement in Ra, were organized into regular hunting parties. Government granted a certain number of free dog licences, which resulted in the destruction of 286 pigs during the year. This effort has avoided considerable damage to crops in this area.

Other areas complaining of damage to crops by wild pigs should take note of the success attending the efforts of the Vunikavikaloa settlers and follow their example.

IRRIGATION.

In the *Agricultural Journal* for December, 1944, mention was made of an irrigation pumping plant installed at the General Experiment Station, Sigatoka.

During the very dry period towards the end of that year, 1944, (November rainfall 0.46) the water level in the river was unusually low. Water samples were taken and tested by the Senior Chemist and they showed a dangerously high salinity, as much as 30 parts per 100,000. The maximum that can be used with safety being about 8-10 parts per 100,000.

Early in 1945 the Senior Chemist prepared and installed at the General Experiment Station apparatus for the rapid determination of the salt content in water. When the pumping plant is running tests are made hourly of the river water as delivered from the pump and as soon as the salt content approaches the danger mark the pump is shut down.

It was found that when the river was flowing freely readings as low as 0.6 parts per 100,000 were obtained. On the other hand readings of 8.0—10.0 parts per 100,000 were obtained at high tide during a short dry spell.

During long dry spells of some weeks, pumping could commence on a falling tide and at half tide and continue right through low tide to half tide (rising) without fear of pumping salt water. Readings taken during such periods showed a salt concentration of between 0.8 to 2.0 per 100,000. It was dangerous to keep pumping after half tide as the salinity rose rapidly in a comparatively short time.

With the assistance of the Harbour Master, Suva, a time table of "safe" pumping times was prepared. This meant that with the knowledge gained from above tests, safe pumping could be controlled by the clock.

The reagent used for the testing of the river water is silver nitrate of a predetermined strength (2.396 gms. per litre). Fifty cubic centimetres of river water are used in the testing sample and to this are added a few drops of potassium chromate as a colouring agent, turning the sample yellow. The silver nitrate is slowly added from a burette to the water sample until the colour changes from yellow to a slight reddish tinge. The amount of salt in the water being found by the quantity of silver nitrate used to change the solution: one cubic centimeter of silver nitrate equalling one part of salt per 100,000 parts of water.

—H.R.S.

PASTURE RESEARCH IN NEW ZEALAND.

IN view of the present state of local pastures and of the need for planned investigations as a basis for future development, opportunity was recently granted to an officer of the Department to visit the Grasslands Division of the Plant Research Bureau, New Zealand Department of Scientific and Industrial Research.

The present brief note refers to some general aspects of the work of the Division which are of interest for and applicable under local conditions. Attention was directed to methods employed rather than to the behaviour of particular species which although successful for New Zealand conditions would not thrive in the tropics.

Grassland farming is now the most important agricultural industry in New Zealand; and it is noteworthy that after over a century of activity in the direction of plant introduction and trial, the most important advances have been made in recent years by concentrated research on a few well-established pasture species of European origin.

The aim of the work has been to utilize the natural strains of these species to produce by selection and breeding improved strains suitable for the varied climatic and geographical regions of the Dominion.

The Grasslands Division has undertaken and brought to a successful issue a very remarkable series of investigations. The practical value of the results is to be seen in their adoption into farming practice throughout the Dominion and in the great increase not only in the area of improved grasslands but also in the carrying capacity and permanency of the country's pastures and in the production of pedigree seed both for local sowing and for export.

In these investigations, priority has been given in the case of each of the selected strains to (1) productivity of dry matter, (2) persistency and (3) palatability; and all experimental results are constantly checked under normal farming conditions.

With regard to the species under investigation, only *Paspalum* or summer grass¹, which is the dominant pasture species on some 691,000 acres in the northern districts of New Zealand, would be at all likely to succeed in Fiji. The establishment of a sub-station in north Auckland has recently been decided upon and the work done there with this and other species should be of considerable interest to Fiji farmers.

The officers of the Station devoted several days to discussions and with their generous co-operation it was possible to study the modern methods employed in dealing with the problems of pasture improvement, establishment and maintenance.

This work has many aspects—it involves the activities of plant breeding and genetics, plant and animal ecology, pathology, chemical and botanical analyses, soil and crop management; and calls for a high degree of patience, ingenuity and technical ability on the part of all workers concerned.

The breeding work involves the detailed study over a period of years of a great number of plants from which selections are made for the production of strains with the desirable characteristics. This is accomplished by individual cross-pollinations or by natural cross-pollination in the open. Grasses do not requiring selfing and it has been found most satisfactory to obtain progeny by means of cross-pollination. The characteristics of all the progeny strains are studied comparatively; for detail, individual plants and for general information, rows or plots are used. Careful records of all parent plants and progeny are kept in the laboratory; and, in the field, stocks of parent plants are kept up by means of cuttings. Seed of selected strains is also kept and remains viable for three years. There is a constant check of the selected strains undertaken by the ecologist on the station who also maintains a number of plots of pure strains for comparative purposes.

Pasture analyses (for botanical composition) are carried out by technicians trained for the purpose—the sample is dissected by hand and calculated on the dry weight of each species in the sample.

Samples are obtained by cutting with suitably designed shears or by mowing with a Sims-Ransome-Jeffrey motor mower provided with special adjustment wheels. The yield and composition of all pasture swards is calculated and many carefully devised methods are employed to ensure uniformity of conditions in experimental plots. For productivity trials, grazing off is considered better than cutting or mowing; and moveable cages are employed as well as special devices for collecting animal wastes

(1) *Paspalum dilatatum* Poir.

in controlled experiments. Associated with the Station is the Plant Chemistry Research laboratory where all chemical investigations on nutritive value and mineral composition of pastures are carried out.

There is a model dairy farm, subdivided into one acre fields where 40 cows are kept. Specially designed stalls for hand feeding experiments are available ; also silos both experimental and full-size types.

In collaboration with the Animal Husbandry staff of Massey Agricultural College, grazing experiments with sheep are conducted on an experimental farm where conditions are entirely comparable with those on normal farming lands but where pasture mixtures, fertilizer programmes and stock management are carefully controlled. The plots provide first-class demonstrations of the practical application of the work being done by the Division.

The pathologists work in close collaboration with the plant breeders with a view to reducing or controlling the incidence of certain diseases of pasture plants.

The distribution of pure line strains of pasture seeds is achieved through the Department of Agriculture's seed certification scheme ; and the enhanced value of certified seed has so impressed the farming community that commercial seed firms vie with one another for the handling of approved strains. With the high prices ruling for seed and with the production of superior strains of pasture plants, seed production has become a specialized business and pastures are frequently sown down with seed production as the main objective and grazing as an incidental.

Farmers who specialize in seed production are able to obtain certified seed such as Government stock seed, pedigree seed or mother seed. Farmers who wish to sow a pasture for grazing purposes only are able to use lower classes such as Permanent pasture and Commercial which give quite satisfactory results.

These seed stocks are produced as follows. Nucleus seed stocks are built up and held by the Grasslands Division in blocks of $\frac{1}{2}$ -1 acre in the first generation ; the second increase is carried out at the Lincoln sub-station in fields of 5-10 acres. The mother seed so produced is passed over to the Agricultural Department for issue to farmers approved under the seed certification scheme, the fields for the production of pedigree seed are registered by the Department and the resultant seed, after sampling, is provided with a certificate of strain purity. By this means large quantities of pure-line seed of high quality are made rapidly available for sale to farmers or for export.

Seed testing is carried out by the Department of Agriculture which handles some 40,000 samples annually. The samples are dissected by technicians into four fractions (1) pure seed (2) other crop seeds, (3) weed seeds and (4) extraneous matter. This work in the case of high-producing strains of two extremely important pasture species, viz. Perennial Rye grass and pedigree white clover is greatly facilitated by the utilization of the ultra-violet lamp and the picric acid test for hydrocyanic acid respectively ; both methods developed by research officers in the Dominion.

In addition to the intensive programme of plant breeding and selection, the palatability trials, the study of pasture mixtures and the maintenance of pure strains of nucleus seed, the Station is actively engaged in soil conservation projects and in weed control experiments.

In the latter connection, the most striking results have recently been obtained with the proprietary compound known as Tufor-D (Methoxone) in the control of such weeds as Convolvulus and Californian Thistle—the latter one of the worst pasture weeds in the Dominion. The particular value of this type of weedicide resides in two properties (1) its selective activity inasmuch as it does not affect grass severely and (2) its translocation in the cell sap, resulting in penetration to and destruction of the roots and underground parts of the weeds.

Finally, the Grasslands research staff has made important contributions to the work of establishing turf on aerodromes and playing greens throughout the Dominion. A very well-planned and most effective experimental area is maintained for the information of green-keepers and others interested in the development of hard wearing turf for bowling, golf or tennis greens. In this instance the problems are somewhat different from those of pasture research as yield of palatable fodder is of no moment, the essential aim being to produce a tough well-wearing weed-free turf capable of sustaining the wear and tear of constant use over prolonged periods. Impressive results have been obtained and the methods employed may also be of considerable interest locally.

—B.E.P.

PRODUCE.

NATIVE root crops and fruits have been in plentiful supply throughout the last quarter. European types of vegetables have been scarce, but with the advent of cooler weather, will shortly be making their appearance on the local markets.

The cooler weather, coupled with shortage of shipping space, has resulted in a decrease in export of bananas, but produce exports on the whole have been satisfactory. The following figures covering exports to New Zealand for the three months 1st March, 1946, to 31st May, 1946, show the quantities shipped. The approximate value in Fiji currency amounted to £17,800.

Bananas	...	...	...	...	20,370 cases
Oranges	...	...	...	...	928 "
Mandarins	...	...	...	...	156 "
Grape Fruit	...	...	...	...	98 "
Avacado Pears	...	...	...	...	39 "
Mixed Fruit	...	...	...	...	46 "
Pineapples	...	...	...	...	37 "
Native Root Crops	...	...	...	...	63 sacks
Peanuts	...	...	...	...	1,172 "
Coconut Meal	...	...	...	...	900 "
Rice Bran	...	...	...	...	375 "
Green Ginger	...	...	...	...	92 "

—R.A.K.

PHENATHIAZINE—A DRUG FOR INTERNAL PARASITES IN ALL TYPES OF LIVESTOCK.

by

R. N. SANDERS, B.V.Sc.

THE Department of Agriculture now has sufficient supplies of phenathiazine to be able to offer it for sale to the public at 7/6 per pound.

Stock owners who have experienced trouble and loss of valuable time trying to dose horses, cattle, pigs and poultry will welcome this drug that can be mixed with the feed and necessitates no prior starvation. Not only is phenathiazine more efficient than any other drug in killing the adult worms of certain species, but unlike other drugs it actually kills the eggs and larvae. The importance of this may not be realized by the majority of the farmers, but how often have they diagnosed loss of condition in a beast as "worms," drenched it, only to find no improvement in condition, and then considered their diagnosis wrong? What has happened in the majority of cases is that some of the adult worms have been killed but the eggs and larvae have been unaffected. The eggs pass out in the droppings, hatch and the larvae immediately re-infect the animal, while the larvae in the animal at the time of drenching are also unaffected and continue to mature. Phenathiazine can prevent this re-infection.

Farmers in this Colony seldom suspect the extent of their losses from internal parasites, others accept these losses (at times up to 100 per cent in calves and goats) as inevitable. However, most of these losses could be prevented by the judicious use of phenathiazine. Consequently a few notes on the use of this drug are offered as a guide. The dose rates have been taken from Gordon (1945).

(a) *Horses.*—

Most people are aware of the symptoms of gradual loss of condition, general unthriftiness and harsh staring coat and realize that the trouble is invariably internal parasites. They do not connect colic or sudden death of an apparent "good doer" with internal parasites. The writer has found the following forms of illness or death due to internal parasites. There is the horse mostly not in good condition that becomes very staggy in his gait then over a period of days becomes "paralysed" in his hind quarters. Actually it is not a true paralysis and in all cases has been found to be due to a mass infestation of *Strongylus* worms. This has been seen in many cases in the dry zone of Viti Levu and has been reported from parts of Vanua Levu and outer islands where popular opinion diagnoses it wrongly as a poison plant. Another type is the beautiful, well conditioned horse that goes down with no apparent pain or other signs of colic and dies within a matter of three to eight hours. Here again the writer has found a recent mass infestation of worm larvae.

The above types of cases mostly occur in the dry season and a few hours after a heavy dew or light rain. The sudden gross infestation is due to the fact that the larvae after hatching remain sheltered about the base of a stand of grass until sufficient moisture is present to work their way up a blade of grass to be eaten by a horse. The heavy rain of the wet season washes a lot of larvae away.

The other type of case is the horse with colic caused by *Strongylus* larvae lodging in and blocking one of the main arteries leading to a portion of the intestine causing possible gangrene to that part of the

bowel and subsequent death of the animal. Thus there are these further symptoms of internal parasites which frequently cause losses that could have been prevented by proper dosing for worms. Very seldom is dosing for worms effective once the three classes of symptoms described above have appeared.

Most losses in horses in Fiji are caused by *Strongylus* species against which phenathiazine is particularly effective. Before dosing a horse with phenathiazine make certain that his bowels are moving freely. This is done in other countries by feeding bran mash before dosing. As bran is seldom available in Fiji, the bowels may be prepared either by feeding soft green para grass for a few days or drenching with raw linseed oil the day before dosing. Care must be exercised in computing the dose as an excess of phenathiazine may cause toxic symptoms. Due regard must be paid both to the condition and size of the horse.

Gordon (1945) suggests 30 grams or approximately 1 ounce as a single dose for the largest horse. He also states that 1 gram (15½ grains or sufficient to heap on a Fiji two shilling piece) per day for several weeks gives satisfactory results. The dose of powder should be mixed with the feed.

(b) *Cattle.*—

The high mortality in young calves in Fiji, usually associated with the symptoms of scouring, swelling between the lower jaws, and anaemia, is due to heavy infestation with cattle hook worm (*Bunostomum phlebotomum*) Barber's pole stomach worm (*Haemonchus contortus*) occasionally also associated with *Ostertagia* and *Cooperia* species. Phenathiazine is also very effective against these worms. The dose rate is 1 drachm (approximately 1 heaped teaspoon) per 20 lbs. live-weight of calf. Gordon advises doses not exceeding 1 ounce for calves under 6 months, 1½ ounces for yearlings and 2 ounces for older cattle. The power may be mixed dry in the feed for stock that have been weaned. Calves are best dosed by making the powder into a thick paste with milk then adding more milk to make an even suspension.

The conical stomach worm (*Cotylophoron cotylophorum*) so commonly found in local cattle is unaffected by phenathiazine. Since this worm seldom causes any loss in cattle this fact is not important except to remind stockowners not to expect elimination of this worm by using phenathiazine.

(c) *Pigs.*—

Gordon states that phenathiazine is variable in its action against *Ascaris lumbricoides* the large stomach worm of pigs, but is effective against the *Oesophagostomum* spp. He advises the following doses :

Pigs weighing	25 lbs.	5 grams
" "	25—50 lbs.	8 "
" "	50—100 lbs.	12 "
" "	100—200 lbs.	20 "
" "	over 200 lbs.	30 "

These doses are also mixed with the feed.

Animals that have been dosed with phenathiazine frequently pass reddish urine for a few days after dosing. However, this should not cause owners to be alarmed.

ANNUAL REPORT OF ENTOMOLOGIST FOR 1945.

By

R. J. A. W. LEVER, B.Sc., D.I.C., A.I.C.T.A., F.L.S.

1. STAFF.

AN Indian Laboratory Assistant was taken on strength in April, the two Fijian Laboratory Attendants being maintained. The two Fijian Assistant Mosquito Inspectors returned to the Anti-Mosquito Office (Medical Department) in October.

2. TOURS.

A month was spent visiting New Caledonia, New Hebrides and the British Solomon Islands studying use of DDT as a mosquito larvicide by the American Forces.

A three weeks trip to Lomaiviti and Lau was made in October and November; the first visit to the latter islands by a Government Entomologist since 1933; nine islands were visited in Lau and three in Lomaiviti.

3. MAJOR PESTS.

Insects reaching major pest status were *Cirphis unipuncta* Haw. on rice in Ra; *Græffea crouani* (Le Guill.) on coconut leaves on Taveuni; *Marasmia venialialis* Wlk. on rice at Buca Bay, Vanua Levu, and *Crocidolomia binotalis* Zell. on cabbages generally.

4. MINOR PESTS.

These comprised *Euscepes postfasciatus* (Frm.) and *Cylas formicarius* F. on sweet potato tubers; *Adoretus versutus* Har. on rose and egg plant; *Anomocaulus fulvovestitus* Frm. on *Pandanus* and *Agonoxena argaula* Meyr. on coconut leaves.

Pests, to man and animals were *Culicoides mollis* Edw., *Ctenocephalus felis* Bouche and the dog tick *Rhipicephalus sanguineus* Latr., the last controlled by phenol in kerosene.

5. BENEFICIAL INSECTS.

Two consignments of the dung beetle *Pachylister chinensis* (Quens.) were sent to Canberra with 85 and 90 per cent of the beetles alive.

A consignment of the Zanzibar wasp *Scolia ruficornis* F. en route to Western Samoa was looked after in transit. Through the courtesy of the Cawthorn Institute, Nelson, *Angitia cerophaga* Grav. were forwarded but heavy mortality on the voyage and immediately on arrival, it is feared, made it an unsuccessful introduction.

The Koster's curse thrip (*Liothrips urichi* Karny) was sent with the fruit fly parasite *Melittobia indica* (Silv.) to Naitauba Island, Lau.

6. MOSQUITOES.

Routine inspections of the aerodromes at Nadi and Nausori and of the seaplane base at Suva Point were carried out, this being the first mentioned by name allowed of these areas. A mosquito survey was also made of Nadi, Lautoka and Nausori townships. Photographs of typical breeding places of the commoner mosquitoes were taken by the Department of Public Relations. Meetings of the Quarantine and Public Health Committees were attended. A cast of the burrow of a land crab (the usual site for egg laying by *Aedes geoskusea* Amos) was made in cement and found to be 6½ feet deep. Supplies of the top Minnow *Gambusia* were distributed in Suva and sent to Taveuni and the predacious bug *Anisops cleopatra* Dist. similarly distributed.

7. INSECTICIDES.

Two cwt. of sodium silicofluoride ordered from Canada was disposed of for cockroach control. Steps were taken to ensure no black marketing of Black Leaf 40 in Suva.

DDT found to be good against fleas, *Adoretus beetle*, cockroaches, head lice and houseflies besides mosquito larvae.

Lead arsenate in rice bran gave good control against cutworms.

8. IDENTIFICATIONS.

Acknowledgment is again made to the Director of the Imperial Institute of Entomology for identifications 246 (248) specimens being identified of which 8 (3) were new to science and 13 (20) not previously in the British Museum. (Figures in brackets refer to 1944). Assistance was also received from Dr. W. Cottier of Auckland (*Aphididae*), Mr. R. H. van Zwaluwenberg of Honolulu (*Elateridae*) and Mr. C. Mulsebeck and Mr. A. Stone of Washington (mosquitoes).

9. PUBLICATIONS.

The writer compiled a section on insect pest control which appeared in a locally printed handbook; an article on "Insect Pests of Economic Crops in Fiji" was published in the *Bulletin of Entomological Research* for January and a note on the Melanesian *Anopheles* complex in the *Transactions of the Royal Society of Tropical Medicine* for July. In addition, twenty notes appeared in the *Agricultural Journal* which is edited by the Entomologist. An illustrated pamphlet, to be published as Bulletin No. 23, was prepared but had then to await the printing of other publications.

10. MISCELLANEOUS.

The Entomologist was a member of the following committees—Noxious Weeds, Quarantine and Public Health and Agricultural Research. Quarantine inspection was carried out on a vessel plying between Apia, Samoa and Suva. Routine control of ants, land crabs, mealy bugs, etc., was carried out. Entomological exhibits prepared for the Fiji Museum. The Laboratory was visited by His Excellency the Governor, Sir Cosmo Parkinson, Professor Paterson and Dr. Dodds of Trinidad.

11. OTHER PACIFIC ISLAND GROUPS.

During a visit to the New Hebrides and British Solomons insect pests of crops were collected. Of importance in both groups in July and August were *Brontispa longissima* Gestro on coconut and *Aulacophora similis* Oliv. damaging cucurbitaceous plants more severely than in Fiji. On Guadalcanal extensive injury was done by a rice stem-borer *Sesamia* sp. near *inferens* Wlk. and grasshoppers on the young plants. Ground nuts were injured by the beetles *Papuana hubneri* Frm. and *Compsolacon gracilis* (Candeze).

The Coconut shield bug, *Amblypelta cocophaga* China, caused severe damage to cassava on Malaita.

In the Gilbert and Ellice Islands, *Papuana hubneri* (formerly present only on Tarawa) is now found throughout the Ellice group on taro (*Colocasia*) and babai (*Alocasia*). This information was kindly supplied by the Secretary to the Western Pacific High Commission.

12. RAINFALL AT SUVA.

The annual rainfall as recorded at Suva Point totalled 115.60 inches, December being the wettest month with 15.59 inches and July the driest with 2.98 inches. There were no hurricanes in 1945.

VETERINARY DIVISION ANNUAL REPORT, 1945.

By R. N. SANDERS, B.V.Sc.

STAFF.

THE Senior Veterinary Officer, Mr. C. R. Turbet, was still on secondment to Ceylon. Mr. H. T. B. Hall acted as Senior Veterinary Officer until November when he proceeded on leave. Mr. R. N. Sanders was transferred from the Western District in November to act as Senior Veterinary Officer. Mr. K. J. Garnett was appointed as Temporary Veterinary Officer in August and was posted to the Western District in November. Usaia Madanawa, Veterinary Assistant, resumed duty in November having served with the Fiji Military Forces. The remainder of the European and Native staff was unchanged.

Owing to the amount of time that the staff had to devote to ringworm control much of the normal work could not be attempted.

ANIMAL HEALTH.

I. *Importations and Quarantine.*

(a) The following livestock were inspected at ports of entry and subjected to quarantine in the appropriate cases.

	Australia.	New Zealand.	Total.
Cattle	17	11	28
Pigs	—	6	6
Poultry	22	143	165
Ducks	—	15	15
Dogs	5	15	20
Cats	—	1	1
Guinea Pigs	—	30	30
Budgerigars	—	14	14
Canaries	—	10	10
Finches	—	6	6
	44	251	295

(b) *Disease of animals in Quarantine.*—Two heifers of a group of 11 head imported from Australia aborted while in quarantine. The agglutination test was applied and three of the heifers were found to be affected with *Brucella abortus*.

(c) *Subsidies paid on imported pedigree stock :—*

5 bulls at £10 each	£50
3 boars at £3 each	9
3 sows at £2 each	6

65

2. *Maintenance of Animal Health.*

(a) *Tuberculosis.*—Tuberculin tests were carried out on the islands of Viti Levu, Vanua Levu, Makogai and Taveuni and the results are summarised below :—

Area.	No. cattle tested.	Negative reaction.	Positive reaction.	Per cent T.B.
Suva-Milk Supply	1,073	1,062	11	per cent 1.02
Navua	1,180	1,135	45	2.8
Eastern District	1,241	1,176	65	5.2
Western District	430	415	15	3.5
Northern District	197	184	13	6.5
Totals	4,121	3,972	149	3.6

The above figure of 3.6 per cent compares favourably with the results of past years. However, it should be noted that in many instances in the Eastern and Navua areas reactor cattle are segregated and not destroyed immediately as in the other areas. These segregated reactor cattle are not included in the test the following year so that herds in the former areas have mostly a far higher incidence of tuberculosis than the testing figures would indicate.

The percentage of reactors for the whole Colony during the past five years is as follows :—

	per cent.		per cent.
1941	10.7	1944	4.7
1942	8.8	1945	3.6
1943	5.6		

These figures show that with perserverance and continued testing the incidence of tuberculosis in dairy cattle can be reduced and it is hoped that the testing scheme can be extended to milking stock outside registered dairy herds.

The island of Rotuma was found to be free from bovine tuberculosis when 248 cattle were tested.

The percentage of tuberculosis in cattle slaughtered in registered slaughter houses on Viti Levu and inspected by the Health Department amounted to 19.2 per cent portions of carcasses and 0.2 per cent whole carcasses condemned. Similar figures for pigs are 5.5 per cent portions of carcasses and 0.2 per cent of whole carcasses.

During routine stock inspections 37 of 24,376 cattle inspected were found to be affected with clinical tuberculosis and destroyed.

(b) *Contagious abortion*.—Blood samples were taken from 68 head of cattle 14 of which were positive when submitted to the agglutination test. The only new outbreak was in heifers in quarantine after importation from Australia as reported above.

(c) *Actinomycosis*.—Only eight cases were reported during the year.

(d) *Cancer*.—Skin cancer was reported on seven occasions in cattle.

(e) *Mammitis*.—Very little bovine mammitis was observed during the year though this condition was troublesome in goats in Ra for a short period.

(f) *Ringworm*.—Ringworm in horses and cattle became a serious epizootic throughout the whole of Viti Levu and the staff spent the greater part of its time in treatment and attempts to control the disease. Later in the year the disease spread to the south-western tip of Vanua Levu then along the northern coast of that island finally working south to Savu Savu. Ringworm was diagnosed on the island of Ovalau in August and was reported, though not definitely diagnosed, to exist on the islands of Taveuni, Koro and Gau in December. There were three forms of campaigns to control the disease. In the Ba-Tavua area peasant farmers were ordered to bring their horses into centres once a week for free treatment by the Veterinary staff and to receive dressing to apply themselves during the week. A total of 22,242 horses were treated by the staff over a five month period. Although there were innumerable prosecutions for failing to bring stock in for treatment the campaign failed. Owners would not bring their animals in regularly. This is illustrated by the fact that at one centre though 1,200 horses had been treated only 120 horses were brought in twice and 35 brought in three times.

Centres for the distribution of ringworm dressing were opened and later closed for want of support by stock owners.

The third type of campaign was in new centres of infection where infected animals were quarantined and restriction of stock movements between infected and uninfected areas was enforced.

The disease affects both horses and cattle. The incidence has been higher in horses than in cattle. The incidence varies greatly between climatic zones and with the season. Generally speaking the disease is more prevalent in the dry zones and infection in horses usually varies as follows—90-100 per cent in November-February; 25 per cent in April-May up to 60 per cent in September-October. The indication is that the incidence increases rapidly towards the end of the cool dry season, reaches a maximum during the early part of the hot wet season then decreases during the wet season.

(g) *Tetanus*.—Two cases only were treated during the year.

(h) *Distemper*.—Canine distemper appeared in several districts as a severe epizootic during the year. Contrary to the symptoms noticed in previous years the nervous syndrome developed very early in the course of the disease. Fatalities were therefore very heavy.

(i) *Poultry diseases*.—Heavy losses in young birds were experienced due particularly to Infectious Catarrh and Fowl Pox. There were no outbreaks of Bacillary White Diarrhoea.

(j) *Parasites*.—Internal parasites continued to cause heavy losses in all types of young stock.

3. Laboratory.

Laboratory work was confined principally to diagnosis of internal and external parasites.

4. Clinic.

Animal clinics were maintained in Suva, Nadi, Ba and Labasa. A total of 1,738 cases were treated.

ANIMAL PRODUCTION AND INDUSTRY.

I. Stock Improvement Ordinance.

Stock Inspections were limited on account of the time that the staff had to devote to ringworm control. However, the islands of Viti Levu and Vanua Levu were well covered. Visits were also paid to Taveuni, Makogai and Rotuma.

The following numbers of stock were dealt with during inspections:—

Cattle inspected	...	...	...	...	24,376
Horses	„	...	...	...	39,665
Pigs	„	...	...	...	1,113
Goats	„	...	...	...	1,248
Sheep	„	...	...	...	32
Poultry	„	...	...	...	842
Bulls licensed	...	...	...	...	134
Stallions	„	...	...	...	5
Bulls castrated	...	...	...	...	132
Stallions	„	...	...	...	58
Bulls ordered to be castrated	...	...	...	...	120
Stallions ordered to be castrated	...	...	...	...	28

Six persons were convicted in the Nadi court for offences under the Stock Improvement Ordinance.

2. Cattle.

(a) *Dairying*.—The year was a poor one in regard to butter fat production. Butter production dropped 33,610 lbs. compared with the previous year and ghee production was 38,277 lbs. less than for the average of the preceding five years.

There are several contributing factors to this apparent drop in production. The chief of these was the greater war-time spending powers of the community which increased the number of persons able to buy butter and ghee. This is also evident in the large imports of these items. The only reliable figures that can be obtained are those for butter fat produced for the two factories in the Colony and these figures are given below. Attracted by the high local price for ghee many previous vendors of cream to factories produced ghee on their own farms. Thus the actual quantity of butter fat produced in the Colony was probably not far short of normal production.

Another factor in the cause of lowered production was the deterioration of pastures because of labour shortages in the maintenance of drains and weeding.

Year.	Butter fat purchased.	lb Butter			lb Ghee	
		Made.	Imported.	Exported.	Made.	Imported.
1930 ..	352,221	440,277	6,797	101,135		254,157
1935 ..	486,560	375,251	14,804	27,736	186,361	13,369
1940 ..	580,985	541,817	2,635	2,288	146,995	10,034
1945 ..	462,122	478,754	72,488		6,954	281,293

(b) *Beef*.—Beef supplies proved adequate during the year though of inferior quality generally. A total of 6,373 head of cattle or 2,044 more than 1944 were slaughtered. This increase in number is due mainly to lighter carcasses.

3. Pigs.

The supply of pigs was again short of demand and a total of 1,665 were slaughtered in registered slaughter houses. Shortage was due, in the main, to the fact that butchers were forced to purchase at the controlled price of ninepence per pound. Pig producers naturally preferred to sell their stock on the hoof to private individuals at far better prices.

The Pig Fattening Scheme run by the Department ceased operations when Army swill became unavailable. A nucleus of the herd was maintained for sale to farmers as breeding stock.

4. Poultry.

Eggs and poultry were in heavy demand particularly in the larger towns. In order to ensure supplies for civilian use the U.S. Army which had been buying 5-6 thousand dozen eggs per month at controlled prices for forward areas were asked to restrict their purchases to 2,500 dozen per month.

Egg prices in country districts varied between 1/9 and 2/6 per dozen while table birds were in good supply at 1/- to 1/6 per lb. live weight. Table birds in the bigger centres brought 3/6 per lb. dressed weight.

5. *Goats.*

Goat breeders experienced heavy losses particularly from wild dogs. Goat has therefore been in very heavy demand though prices for goat flesh have been as low as 1/3 per lb.

6. *Fish.*

Although the war-time restrictions on fishing were lifted late in the year the demand for fish even then far exceeded the supply.

7. *Horses.*

It will be seen above that the Colony is rapidly becoming overstocked with horses. The majority of the horses seen are far too light for draught and in most cases are not essential as hacks. Far too much valuable grazing is taken up with these useless animals which could be better utilized for stock of greater economic importance. The Veterinary staff is doing its utmost to combat this and fewer licences (5 as compared with 134 bulls licenced) were issued. In spite of the huge supply, poor type horses still bring good prices. This is due to the great popularity of horse racing following war-gained wealth. It is common to find several race tracks in small country districts.

8. *Experiment Farms.*

The Veterinary staff continued to give advice on the care and management of livestock kept on the various Experiment Farms.

At Nasinu Experiment Station Tamworth and large White pigs; Australorp was available for purchase by farmers.

Similarly, smaller stocks of poultry and pigs were kept at the General Experiment Station and Central Experiment Station.

9. *Brands Ordinance.*

A total of 420 brands were registered during the year bringing the total number of brands in the Colony to 3,389.

Four convictions were obtained in the Nadi Court for offences under the Brands Ordinance.

FRUIT FROM THE COLONIES.

With grapefruit at last coming our way, appetites are whetted for more citrus fruits. What are our chances of daily glasses of health-giving fruit juices—orange, grapefruit, pineapple, tomato? Cannot our Colonies provide us with what America drinks daily?

The Colonial Office says that chances are not high. Growers prefer to ship whole fruit because prices offered are far higher. Our pineapples were grown, too, in Singapore, some in Fiji and Jamaica. Trinidad has a grapefruit canning industry, British Honduras its industry, but both are held up by the shortage of tinplate. Canada grows tomatoes suitable for canning but finds the price offered for juice canning absurdly low compared with what is given for whole fruit.

And bananas? Disease riddled West Indian production. Disease-free trees from which to breed must come from Siam and Indo-China, which so far has been impossible. So chances of an early return to shipments of pre-war scale are slim.

—ALISON SETTLE in *Observer* (London), 19th Aug., 1945.

ANIMAL PRODUCTION.

by

R. N. SANDERS, B.V.Sc.

It should not be necessary to stress the importance of animals to a community. However, seldom in Fiji is it fully appreciated just what role livestock and their products play in our internal economy. This is due perhaps to the fact that it is impossible to evaluate accurately the amount of eggs, poultry, milk, ghee, beef, dripping, goats, etc., actually produced and consumed locally. More attention is focussed on our exportable commodities, the figures for which can be easily assessed and, since they are sold overseas, are frequently, though wrongly, regarded as our sole source of wealth.

Food produced and consumed in the Colony is a far more important asset than our commodities sold overseas. Just how important may be illustrated by any one of the locally produced animal products. If no eggs were produced in Fiji it would cost, at current rates, £285,999 per annum to import the 1,906,666 dozen eggs needed to allow 220,000 persons to have two eggs per week. This reveals the humble hen in an entirely new role. Over three million pounds of locally produced beef was bought by local butcheries in 1945. This beef, together with local pork, was worth £70,540. This does not include meat used on plantations, nor cattle and pigs slaughtered by Fijians and others.

Although creditable for a small Colony, the amount of foodstuffs of animal origin grown here leaves much to be improved upon both in the amount produced and in the cost of production. During 1944, £95,296 left the Colony to buy foodstuffs of animal origin, most of which could be produced within the Colony. A total of 72,488 lbs. butter and 281,293 lbs. ghee were imported during 1945. This compares most unfavourably with the 1940 figures when 2,635 lbs. butter (2,288 lbs. exported) and only 10,034 lbs. ghee were imported.

It is recognized that animals do not produce as well in Fiji as in other parts of the world with a similar climate. Contrary to popular opinion this is mostly due to poor animal husbandry on the part of a large section of farmers. Animal husbandry embraces feeding, breeding and general management. The days when livestock could be turned loose on a field and be depended upon to give a fair yield have left us for ever. Once fertile soils are now feeling the strain of years of producing beef, milk, pork, etc. The tendency in Fiji is to shift stock to another area when the existing holding becomes poor, eaten out and covered with weeds. The extent to which this type of management can be practised on small islands is very definitely limited. The time is now with us when we have to look back on what has been depleted and see either ruin or look for means of utilizing depleted soils. If we look ahead at estimated increases in population the necessity for action now to save the soil and pastures is even more striking. The necessity to increase animal production is also evident. The limitations of area in small islands prevents much expansion, therefore the present systems must be made more efficient.

Too frequently animals are raised on soils either naturally poor, or poor from misuse. There are many more areas that can be opened up for development and even if the Fijian owners are willing to permit such development, the time is not far off when our rapidly increasing population will have rendered that land as unproductive as much as the present grazing

country. It is obvious therefore, that stock owners will have to make the present available land and livestock more productive. The means of doing this is improved animal husbandry. The improvement will fall into two categories. The application of basic principles which have already been developed and proved in other countries and experimentation to develop means of attacking animal husbandry problems peculiar to Fiji.

Feeding is one of our biggest problems as fertilizers and food supplements used in temperate climates are either unavailable or prohibitive in cost. But this should not prevent the farmer using either farmyard manure or local food concentrates. Certainly in regard to the latter it still has to be ascertained what is the exact economic ration of coconut meal, molasses, rice bran, etc., to feed to a goat, cow, pig or fowl under local conditions.

Our pastures are poor in protein. However, it is not known at what stage of growth the local grasses are richest in protein. Little or no use is made of local legumes rich in protein. In this respect *Leucena glauca* is regarded as a weed, whereas, in similar zones in other parts of the world it is respected as a valuable source of plant protein. Certainly this plant is not to be compared with the clovers and lucerne of temperate zones. But these plants are not economic producers in Fiji and *Leucena glauca* is preferable to little or no protein. More efficient tropical legumes are now under trial at our Departmental Stations. Slight modifications in cultivation and feeding may have to be developed in regard to these legumes. They may not be as efficient in Fiji as they are in other parts of the world and this is where the trials conducted by a Department of Agriculture become valuable even if the trials only prove that the plants are not adaptable to conditions in Fiji.

Fiji stock-owners experience a lush growing season followed by a prolonged dry season yet they make no attempt to conserve the excess fodder for the times of shortage. No animal can be expected to be an efficient productive unit if for one half of the year its body works to build up the semi-starved losses of the previous half year. With one exception no farmer cuts the surplus feed and turns it into hay for the dry season. It is admitted that in certain parts of the Colony it would be impracticable to make hay, but in these areas ensilage could be made. Excellent ensilage has been made in Fiji, but for various reasons, mostly lack of initiative, the practice has never persisted. It is predicted that in a few years many farmers will be forced to make ensilage if they are to get an economic return from their livestock.

The management of livestock here leaves much to be desired. The rapid increase in soil erosion and the replacement of pastures by weeds is indicative of poor management, particularly overstocking. The larger holdings can frequently be noticed by the amount of weed growth. It is obvious that many landowners are not making the best use of available land. Certainly through lack of labour during the war years the density of weeds has increased, but there were many acres of land rendered useless by weeds even before a labour shortage developed. In many instances the cost of clearing is more than the value of the land. Weeds are a direct result of overstocking and stock-owners must realize that they should aim at smaller holdings with a greater efficiency of output per acre. This can best be done by sub-division and rotational grazing. Livestock then are concentrated on a small area for a short time. Before that area becomes eaten out the stock are moved to another, and the first area is rested. The pasture is then kept

at the most nutritive stage and gives the livestock the maximum nutritive return. A smaller area is needed for the same number of beasts and the pasture stands up to adverse climatic conditions better.

It has been shown that in temperate climates cattle do 40 per cent of their grazing at night and 60 per cent during the day. Further, most of the day-time grazing is done in the cool of the day. This illustrates how much local cattle lose by being restricted to small eaten out night paddocks or in the case of many peasant owners being confined to a small bare yard during the night and not released for either grazing or water until 10 or 11 a.m.

The heavy losses in young stock in Fiji are well known, yet stock owners will persist in keeping such animals in confined damp areas, grossly contaminated with the eggs and larvae of internal parasites, and ideal breeding grounds for other diseases. Some years ago officers of this Department demonstrated how, by raising pigs on concrete, they could be reared free from kidney worm. Yet slaughter house returns still show up to 90 per cent infection with this parasite.

The majority of animals are bred far too early in this Colony. Mere calves are put to the bull and if they survive parturition the resultant calf is puny. If it survives the semi-starvation ration allotted it, and the disease of a filthy cold pen, it will in its turn produce even a smaller calf. The owner invariably considers it time he purchased an imported bull.

However, animal breeding is at the moment the least important of our animal husbandry problems. Many farmers are firmly convinced that the solution to their problems of low production and poor type animals would be for high class stock to be imported from overseas. This introduction of new blood would give but a temporary relief. The old adage "half the breeding is in the feeding" has been proved correct both by experimentation and experience in many parts of the world. Just as the most perfect aeroplane engine would soon cease to function properly if fed inferior fuel and not maintained correctly, so will the highly bred animal and its progeny soon revert to the common type of beast if fed and managed on the same low level as is customary in Fiji. Thus, at this stage, it would be a waste of money to go to the expense of importing first class stock. When farmers can show improvement in their present methods of feeding and management then it will be the appropriate time to get the full benefit of imported blood.

There is, however, much experimental work in animal breeding to be done particularly with regard to cattle. The Indian peasant farmer has developed by cross-breeding, a type of animal which does remarkably well considering the poor manner in which it is fed and managed. It has been proved in most tropical countries that the Zebu stands up to tropical climates far better than European breeds of cattle. This is because "Zebus have retained and European cattle have practically lost their ability to perspire, i.e., sweat" (Kelley).

Further it has been observed that Zebus have the ability to pass this characteristic on to their progeny when crossed with European breeds yet retaining the ability to produce either beef or milk. The cross-bred progeny, moreover, are not only superior to the pure bred European breeds in beef and milk production under tropical conditions but are more resistant to disease.

Rhoad, developed a heat tolerance test for cattle in order to ascertain how different breeds and crosses could stand up to tropical conditions. This tolerance is expressed by means of a coefficient of heat

tolerance in which 100 would represent perfect tolerance. He supplies the following figures :—

Pure Brahman (Zebu)	...	...	...	89
$\frac{1}{2}$ Brahman $\frac{1}{2}$ Angus	...	...	...	84
Pure Jersey	...	...	...	79
$\frac{1}{4}$ Brahman $\frac{3}{4}$ Angus	...	...	...	77
Hereford	...	...	...	73
Pure Angus	...	...	...	59

This illustrates both the ability of the Zebu to pass its heat tolerance on to its progeny and the disadvantage suffered by pure British breeds.

Yet many dairy and beef breeders who pride themselves on being practical have failed to see the possibilities of the Zebu cross and still persist in trying to maintain pure bred British breed herds and expect miracles to be worked by the importation of an occasional bull.

"Numerous examples are found of the failure of dairy cattle of temperate climate origin to improve native types in the tropics and sub-tropics, because the constitution of the grades is inadequate to sustain increased production in the tropical environment.

The application of a grading-up policy in any area of relatively low production is not a cure for the inferiority of the stock, though it may help if better stock management is also developed; and in some cases an improved environment may not only render grading unnecessary but even produce a situation in which grading to a particular pure-bred type would be a disadvantage."

The above quotations from *Livestock Improvement*, by J. E. Nichols, may serve to illustrate that there are very definite limitations to what improvement may be expected from imported stock.

It is admitted that the majority of peasant farmers have swung too close to the Zebu and to check this, high class stock will have to be imported. So that while peasant stock is being graded up with British breeds, pure-bred herds will have to be graded up with Zebu blood. This not entirely satisfactory method will have to be practised until such time as milking and beef types of the Zebu cross have been standardised as distinct breeds. The King Ranch, Texas, U.S.A., has almost standardised the beef type Santa Gertrudes which is a Zebu cross (Kelley) and there is no reason why this cannot be done with milking types for the tropics.

Similar breeding work has also to be done in Fiji with goats, pigs and poultry. But few realize the necessity for this work. These are all problems which must be studied now before economics and increased population force it upon us.

Animals are but one link in the chain joining the soil and plants with man. We can see now the ravages worked on the soil by man with his poor crop and animal management. We have seen recently the lands of peasant farmers grossly overstocked with poor cattle while local butcheries were placed on quotas because of the lack of killable cattle. This waste is seen also in poultry, pigs and goats. Because of heavy losses and low production consumers have to pay more. Increased prices always rebound on the producer by way of an increased cost of living.

The basis of a healthy internal economy is a low cost of living. Unless we can increase the production of local foods to keep up with the heavy demand of a rapidly increasing population the cost of living will rise and a possible lowering of the standard of living may ensue.

Imports must be paid for and are set against our exports. Provided our export trade increases correspondingly we can afford to import. But in normal times few, if any, of our commodities can compete with overseas products. Dessicated coconut and coconut fibre products, to name but two items, can be carried half way round the world and landed in Fiji, cheaper than we can produce them ourselves.

We already make heavy imports of animal products. As our population increases these imports will increase accordingly. It is doubtful whether we will ever be able to greatly increase our exports. If we cannot, it will be a matter of either producing more locally or doing without. Our future welfare is inevitably bound with a more efficient use of the land and an improved management of our livestock.

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VETERINARY NOTES.

ANIMALS IMPORTATION ORDINANCE.

RECENTLY a number of people have committed offences under the Animals Importation Ordinance (Cap. 137). In most cases it has been a question of ignorance of the requirements under the Ordinance and its Regulations. This ignorance has led to instances where permission to land has been refused necessitating either a lengthy and costly quarantine period or destruction at sea.

Persons intending to import animals should note the following and much disappointment and inconvenience will be obviated :—

- (1) The term "animals" includes all domesticated and undomesticated mammals and birds; reptiles, fish; and the eggs of birds, reptiles and fish.
- (2) The introduction of all animals or any portion of an animal except carcases properly preserved, and manure that has been properly sterilised or anything that may have come in contact with any foreign animal is prohibited except as follows :
 - (a) Horses from New Zealand, New South Wales, Victoria, South Australia, Tasmania and the United Kingdom.
 - (b) Asses from France, Spain and Portugal.
 - (c) Cattle from New Zealand, Canada, Tasmania, New South Wales, Victoria, South Australia and United States of America.
 - (d) Sheep, goats and swine from New Zealand, New South Wales, Victoria, Tasmania and the United Kingdom.
 - (e) Dogs and cats from New Zealand, New South Wales, Victoria, Tasmania, United Kingdom, Western Samoa and Hawaii. No quarantine period is required for dogs and cats from New Zealand and the Australian States mentioned above provided they are accompanied by the proper papers.
 - (f) Domesticated poultry from New Zealand, New South Wales, Victoria, United Kingdom, Canada and the United States of America.

The classes of livestock mentioned above will not be permitted entry unless they are accompanied by the proper health certificates, shipper's statutory declaration and a certificate from the masters of the importing vessels. Many people have been disappointed when entry has been refused because one or more of the above papers have not accompanied the animal.

Persons intending to import undomesticated animals such as canaries, finches, parrots, gold fish, etc., must first get the written permission from the Director of Agriculture and these animals must also be accompanied by health certificates, etc.

Suva, Lautoka and Levuka are the only ports where animals are permitted to land except in cases where a quarantine period is laid down when Suva is the only port of entry. Animals travelling by overseas aircraft can therefore only be permitted entry if the aircraft lands at the three towns mentioned above.

A special warning is given to persons returning from leave, bringing with them settings of eggs for they are reminded that the eggs must be accompanied by a Veterinary certificate as well as a shipper's declaration. Failure to do this may render the importer liable to prosecution.

The necessity for the importation control is seldom fully appreciated by the public. It should be remembered that Fiji is fortunately free from most diseases which cause serious mortalities in humans and livestock. Diseases such as rabies, psittacosis, rinderpest, foot and mouth, tick fever, anthrax and pleuro-pneumonia, to mention but a few, would be most difficult and costly to eradicate. Even now it is difficult to raise livestock in this Colony. The added burden of any one of the really bad diseases would make livestock breeding impossible.

Some may ask how was it that at least one of the serious animal diseases did not get into the Colony before Veterinary control. The answer is simply that transport between other ports and Fiji before Veterinary control was so slow that no group of animals would have survived the voyage if any acute infection had been present. We did get and still have the more chronic diseases such as tuberculosis and actinomycosis.

The risk of getting the more acute and serious diseases naturally increases in direct proportion to the speed of vessels. Thus the risk increased when the steamship replaced sailing vessels. The present risk with aircraft is very great and control will have to be increased.

The Inspecting Officer no more relishes ordering the destruction of an imported pet than the owner. But on the former's shoulders hangs the burden of realizing that, though the chance may be slim, weakness on his part may mean the end of livestock breeding in Fiji or even the loss of human life if rabies and other diseases should enter the Colony.

The person who either wittingly or innocently smuggles eggs into the Colony may be responsible for making it impossible to breed poultry in the Colony for there are at least two diseases of poultry transmitted through the egg. These diseases already cost the poultry industry of New Zealand and Australia many thousands of pounds annually. Fiji may not have either the means or the money to combat them.

Thus in conclusion persons intending to import livestock or eggs etc., are asked to co-operate and see that the proper forms accompany the beast or bird. When in doubt get advice from either the Senior Veterinary Officer or the nearest Veterinary Officer.

THE SELECTION OF PEDIGREE STOCK WITH PARTICULAR REFERENCE TO THE CERTIFICATE.

by

T. P. GARDINER.

FOR those about to import pedigree stock into the Colony, either at present or in the future the following may be of interest, for one often hears of an animal being bought at an exceedingly high figure, privately or at one of the annual sales, later to find that the buyer is disappointed because (1) if the animal is intended as a herd sire it is found that his offspring are not producing as expected, (2) if a female, it is found that the production of the offspring is showing a decline on that of the dam.

No doubt there are various reasons for this ; but it is considered that a little more knowledge and experience of interpreting the pedigree certificate would help to eliminate disappointment and consequently raise the standard of stock in general, for fewer but better animals would be registered as pedigrees and offered for sale. In selecting an animal the following are the three main points :—

- (1) High productive backing.
- (2) Constitution.
- (3) Type.

These should all show on the pedigree certificate and to illustrate the point it is intended to quote the selection of a bull to be used as a dairy herd sire.

(1) BUTTER-FAT BACKING.

The butter-fat of the dam should be higher than that of the grand dam or great grand dam. In other words a gradual increase of butter-fat for, say, four or five generations is much preferable to say 800 lbs. of fat produced by the grand dam and only 600 lbs. produced by the dam. The latter goes to show that this particular strain is on the decline, and to arrest this, new blood would have to be introduced. However, there are certain factors which should be taken into consideration, e.g., individual feeding and care against ordinary herd conditions.

(2) CONSTITUTION.

Right through the certificate there should be shown a reasonably high-producing continuous record every year for a long period, proving that the dam gets in calf regularly and is resistant to disease. It is also desirable to see the record of some of the dam's daughters which should show her ability to reproduce her type.

(3) TYPE.

Although certain creditable show-ring performances may be shown this is considered of minor importance in comparison with (1) and (2), for on frequent occasions an animal showing almost perfect features and capable of taking a prize has proved to be a worthless producer or herd sire, whichever the case may be.

Nowadays it is nearly always possible to know something about the fertility of the male animals' ancestors and as this is a most important point no effort should be spared in checking this. The writer has known of cases where a so-called excellent animal has been purchased at a high figure and when put with the herd has proved to be of low fertility and in one case was completely infertile. Too much stress cannot be placed on this point in regard to Fiji for with the climatic conditions prevailing here it is considered likely that any weakness on this point will predominate.

At the present time there is a certain breed of cattle which it has been considered is now showing a weakness with regard to fertility and one of the reasons put forward is the fact that this particular breed has been line bred for years with a result that too much in-breeding is taking place, therefore constitution is on the decline.

Although this article has been written with regard to dairy stock the same rules can be applied to the selection of beef cattle, pigs and poultry and under no circumstances should a buyer think that just because he pays a high price for an animal he is going to get a good one.

With regard to dairy cattle, pigs and poultry, a recording system now exists in Australia and New Zealand and these records should be carefully scrutinised and understood before a final selection is made and should no productive record be shown, then the buyer should not entertain the thought of making a purchase, even though the animal may appear to be an excellent type.

It should be borne in mind that the above is only a brief outline and is intended as a guide ; but should intending purchasers be unable to attend to the selection personally they are advised to get in touch with the various recording councils whose duty it is to give all the advice possible and reasonable assistance.

STORING SWEET POTATOES IN ZANZIBAR.

By G. E. TIDBURY, Agricultural Officer.

UNLIKE cassava, some varieties of which can be safely left in the ground for several months after the crop is ripe, sweet potatoes must be dug when the tubers are fully grown or rotting and insect infestation will rapidly destroy the crop. A further disadvantage of this crop in Zanzibar is that during the hot season, November to February, tuber formation does not take place even if the vines survive the hot, dry weather. There is thus a great shortage of sweet potatoes during the first half of each year. Some attention has, therefore, been given in this Protectorate to finding a simple method whereby the sweet potato can be stored for several months.

In storage trials which involved drying, the use of a copra kiln suggested itself as a means of thorough drying and in all such tests parallel series were dried in the sun and in a "Seychelles" copra kiln. The "Seychelles" kiln is a room containing an enclosed furnace, the walls of the room supporting the shelves of wire netting on which the copra is placed.

Previous literature on the subject indicated that in dry areas simple methods of storage existed. In one instance, reported from Rhodesia⁽¹⁾, the crop is stored by placing the tubers between layers of wood-ash either in drums or pits. Another method used in the Lake Province, Tanganyika⁽²⁾ consisted in cooking the potatoes, slicing or squeezing them flat and then drying in the sun. A more ambitious drying method used on a large scale with English potatoes⁽³⁾ suggested itself for sweet potatoes also. This consisted in using steam to "blanch" the tuber before drying.

To test the first method of storing in ash, freshly dug tubers were placed in large wooden boxes between layers of coconut husk ash. This ash was very clean and dry. Within one month the potatoes were found to be mouldy and rotten. Similar results have also been observed when imported English potatoes were stored in wood ash. The climate of Zanzibar would appear to be too humid for this method to be successful.

The second method, which involves cooking before drying, gave equally poor results. The tubers were washed and cooked and then either sliced or squashed into flat cakes. Drying was done in the sun and in a copra

kiln. In all cases moulding occurred very rapidly and although the kiln-dried produce was hard and dry it was almost black and most unattractive.

Complete success was had, however, when the uncooked tubers were dried. Whole potatoes, even when small did not dry well and it was found necessary to cut the tubers into slices less than a quarter-inch in thickness. These dried rapidly in the sun and the kiln without discolouring but it was found necessary to peel the potatoes first as the skin was most difficult to remove after drying.

Kiln drying took five days and sun drying on a cement drying-floor a little longer. The final product weighed approximately 30 per cent, if unpeeled, and 20 per cent, if peeled, of the fresh weight. The slices curled slightly during drying, retained a white or creamy colour and when dry were extremely hard and difficult to break with the fingers. In order to prepare the dry slices for the table they were soaked in water overnight before cooking. Public demonstrations of this storage method were made in Zanzibar and Pemba and the cooked product was found to be very sweet and palatable.

Potatoes dried in this manner can be stored for a very considerable period although care must be taken to avoid insect attack as the product is most attractive to insects. After five to six months storage in Zanzibar the dry slices were still in fair condition and considerably more attractive in appearance than dry cassava stored for a similar period.

For completeness a reference is included in this note to a clamping method used in Barbados ⁽⁴⁾ which was not tried in Zanzibar. The steam blanching method mentioned above was tried but proved very difficult under plantation conditions and was considered quite impossible for recommendation to natives. The yellow translucent appearance mentioned in ⁽³⁾ was found to be patchy and the final dry product most unattractive. Given factory conditions this method would probably be very successful.

—*The East African Agricultural Journal*, Vol. 11, No. 1, July, 1945.

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- (4) The Storage of Foodstuffs in the Colonial Empire, *ibid.*, Vol. V, May, 1940, p. 459.

KUDZU.

KUDZU is an old Japanese plant, grown in the Orient for its edible tubers (roots) and hemp-like fiber. In the U.S., where it was first grown in 1895. it has been known chiefly as a fast-growing porch vine. But southern farmers now cultivate it as a field plant to cover eroding soil. Planted from "crowns" (roots and buds), it spreads quickly, putting down new roots like strawberry runners. Its big leaves, shed each fall, eventually cover the ground with a thick, flaky carpet like a forest floor. Because it may be winter-killed by hard frosts, it has so far been grown only in the South, but the Department of Agriculture is trying to breed hardier strains.

Kudzu not only stops erosion but so enriches the soil that, when plowed under, it increases corn yields by two to sevenfold. As rich as alfalfa in protein and carotene, kudzu leaves can be used for grazing or cut as hay. Dehydrated, they also make a fine breakfast food, according to enthusiasts; some kudzu growers have gone so far as to concoct a recipe for Kudzup.

Science, 8th December, 1944.

THE CONTROL OF NUT GRASS BY MEANS OF COVER CROPS.

By C. M. DASS—Senior Field Assistant.

Nut grass (*Cyperus rotundus*), known as "Soronakabani" to Fijians, and as "Motha" to Indians, is a low sedge producing numerous underground tubers or "nuts" by means of which, and by means of wind-distributed seed, it propagates readily. It is a recognized obnoxious weed of arable dry-land farming.

The weed is readily controlled and even eradicated by prolonged flooding of the infested land, so that it is not a pest of wet padi lands. It is not a major pest of vigorous-growing cultivated crops such as sugar cane, cotton and maize, except during the early stages of growth of these crops, when it necessitates much hand-weeding. It is, however, a serious pest of root-crops such as potatoes and peanuts and of crops that are not cultivated such as dry-land padi.

In small plots nut grass may be eradicated by digging up and destroying the roots and tubers by fire, but this is a laborious and expensive method and is impracticable on a field scale.

In many countries attempts have been made and are being made to check or destroy this weed and to date chemical and biological methods have not been completely successful. Some measure of control may be achieved through cultural means.

Recently it was reported in the publication "Indian Farming" that a large measure of success was achieved in controlling nut grass through clean fallow, that is through repeated stirring of the soil at definite intervals over a period of several months before cropping.

Though this may be an effective method, it is considered by the writer as not economical, particularly to the small farmer, who can ill-afford the luxury of a lengthy fallow with the additional expense of many cultivations for which he does not receive immediate returns.

At the General Experiment Station attempts were made to control nut grass by growing maize crops and cultivating them at short intervals throughout the growing period, but the weed grew vigorously with the beginning of the rains and smothered the dry-land padi crops which followed.

Experimental data are not available but practical experience indicates that a high measure of success may be obtained in dealing with this weed by means of cover crops followed by cereals.

In one field measuring $1\frac{1}{2}$ acres sweet-potatoes were grown under irrigation from April to September, 1945, and a complete cover was maintained for some three months. The trash was ploughed-in immediately after harvesting the crop, and disced. The land was cross-ploughed in October and disced again. The third ploughing and discing were done in November immediately before planting dry-land padi, which was done with the McKay seed drill.

An excellent stand of padi resulted which outgrew the nut-grass, and, though the crop was damaged severely by wind and rain at the time of maturity in March-April, a yield of 1,991 lbs. of padi an acre was harvested.

An adjacent field of $1\frac{3}{4}$ acres was planted with a crop of maize in May, 1945, and received six cultivations. The crop was harvested in October and the field was given four ploughings and four discings over a period of six weeks. Dry-land padi was drilled in November, but nut-grass beat it and it was ploughed out. The second sowing of padi was made with the drill in December. The resulting crop was stunted, poor and almost smothered with nut-grass. A yield of only 517 lbs. of padi per acre was obtained.

It is believed that growing sweet-potatoes in nut-grass infested land not only checks the growth of the weed and prevents it from forming new tubers, but the operations involved in harvesting the sweet-potatoes leave the soil in good tilth to the advantage of the succeeding crop. Moreover, the ploughing-in of all leaves and vines adds green manure to the soil.

This year, a half of one field has been planted with sweet-potatoes, following dry-land padi crop, and the other half with mauritius beans, and the effects of these treatments will be observed on the next season's padi crop.

It is suggested that the following rotation in which padi is grown once every year will prove of benefit to farmers in nut-grass infested land outside the sugar-cane area in the dry zone :—

Sweet-potatoes	...	...	...	May to September
Dryland padi	...	...	...	November to April
Mauritius bean	...	...	...	May to September
Dryland padi	...	...	...	November to April

When a fair measure of control of nut-grass has been achieved by this method, it would be possible to include maize, potatoes and peanuts in the rotation.

.. Note:—Mauritius bean from May to September will probably not make a good cover. But since the dry-land padi is usually harvested in March-April, it would be possible to sew the legume while there is still sufficient moisture in the soil for a quick germination.

Another suggested rotation, in which padi is grown once in two years and a lengthy cover of sweet-potatoes and mauritius bean maintained, may be worth trying. This is as follows :—

Dry season	...	...	...	...	Sweet potatoes
Wet	..	...	...	...	Dry-land padi
Dry	..	...	...	...	Sweet potatoes
Wet	..	...	...	...	Mauritius bean
Dry	..	...	...	...	Sweet potatoes
Wet	..	...	...	...	Dry-land padi.

ENTOMOLOGICAL NOTES.

Koster's Curse (*Clidemia hirta* Don.) in the B.S.I.P.: A consignment of thrips (*Liothrip urichi* Karny) forwarded to the Senior Agricultural Officer, British Solomon Islands Protectorate in March for liberation on Koster's Curse, was delivered but appears to have failed to survive after release.

A further consignment forwarded in April arrived in good condition and it is expected that they will establish themselves. Results will be recorded in due time.

House Fly Parasites (*Pachylister chinensis*, Quens.). Supplies of this common house fly (*Musca domestica* L.) parasite were secured and despatched by air to the Director, Division of Entomology, Canberra, during the month of May.

Fruit Fly (*Dacus* sp.) The breeding of the fruit fly parasite *Melittobia indicum*, Silv., was continued and some 3,000 liberated each month.

Acknowledgment.—Acknowledgement is due to the Imperial Institute, London, for the receipt of lists 766/767 (Australasia) of indentifications.

SOYBEAN OIL.

WHAT is the outlook for increased soybean oil usage in the United States in the post-war period? In the drying-oil field some recent observations have been quite optimistic and others have indicated that an abundance of various drying oils will be available. Soybean oil has not been a vital factor in the drying industry in the past. In 1941 its steady slow growth reached a usage just short of 50,000,000 lbs. (22,500 metric tons) a year (about 5 per cent of the total oil usage in the "drying-oil" industry). During the past three years due to restrictions this annual usage has dropped to somewhat less than half this quantity. It should be possible to recapture this lost ground and perhaps extend it, but the competition will be severe, particularly from such new products of research as dehydrated castor oil which will challenge the recognized advantage of soybean oil alkyls as a non-yellowing interior finish.

In the edible field the post-war competition of other oils will also be intense, but the picture for domestic soybean oil appears fairly bright for the following reasons: It is unlikely that the cotton crop will be increased, hence the available cottonseed oil will remain near its present level. Similarly, the supply of peanut oil from domestic sources is not likely to expand. It follows then that large supplies of other oils will be needed to furnish the oil for a 2,200,000,000-lb. to 2,600,000,000-lb. (1,000,000 to 1,200,000-metric ton) vegetable edible oils market. Soybean oil has had public acceptance in all types of edible products of good quality in the war years. There are no other domestic oils available in large volume, and competition will come mostly from coconut and similar oils for usage in margarine and salad-cooking oils. For margarine there is considerable advantage in using oils from domestic farms to compete with butter fat from the same and other domestic farms. All of these factors favour continued usage of soybean oil in edible field. The war has given soybean oil an enviable opportunity in the edible fats and oils industry. It is up to the soybean industry to improve the quality of crude soybean oil by all methods—agronomic improvement of varieties, improved growing, harvesting, cleaning and storing of beans, improved oil processing with rewards for superior quality, continued research to improve its flavour stability and continued development of "fractionated" soybean oil.

—(From *Soybean Oil*, O. H. ALDERKS, Ivorydale, Ohio, Soybean Research Council, Oil & Soap, September, 1945.)

SUVA POINT RAINFALL, 1945.

Month.	Inches.
January..	5-96
February	11-39
March ..	12-20
April ..	10-63
May ..	9-22
June ..	6-64
July ..	2-98
August ..	5-60
September	9-45
October ..	11-94
November	14-00
December	15-59
Total for the year ..	115-60